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EXAMINER

MACKOWEY, ANTHONY M

ART UNIT

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2624

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/026,433	ARAKAWA, SATOSHI	
	Examiner	Art Unit	
	Anthony Mackowey	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-4,6,8,9,11-24 and 26-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-4,6,8,9,11-24 and 26-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 15, 2007 has been entered.

Response to Arguments

Applicant's Remarks do not include detailed arguments in addition to those previously presented in the Amendment After Final. Examiner will address the arguments presented with the Amendment After Final filed February 15, 2007.

Applicant's arguments filed February 15, 2007 have been fully considered but they are not persuasive.

Regarding arguments presented for claims 6 and 13, Applicant submits Shimura does not include a common energy subtraction processing means. Applicant's submits, "There is no discussion of a common subtraction processing means to obtain the soft tissue image 47 and the bone image 43." Applicant further submits, "Shimura specifically contemplates use of different weighting coefficients, and thus different subtraction operations" (page 12, lines 1-8). The Examiner respectfully disagrees with Applicant's assertion. Examiner again refers to Figure 11 and column 14, lines 28-37 of the Shimura reference, clearly showing the energy subtraction

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processing is performed by a single image processing and displaying apparatus 30. The image processing and displaying apparatus 30 is performing both subtraction processes to obtain the bone and soft tissue images and therefore can be construed as a common energy subtraction processing means. Examiner concedes that the use of different weighting coefficients to perform the soft tissue and bone energy subtraction would indicate different subtraction operations. However, the Examiner fails to understand how the teaching of different weight coefficients used by the image processing apparatus in the two energy subtraction operations would indicate the subtraction processes are not being performed by the same image processing apparatus.

Regarding arguments presented for claims 24 and 26, Applicant submits the cited portions of the Andrews reference (col. 3, lines 22-33 and col. 5, lines 13-48) do not support the rejection (page 12, lines 12-13). Applicant's arguments are then drawn to the details of the Andrews reference and how the subtraction processing taught by Andrews differs from the present invention (remainder of page 12). One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In the Previous Final Office Action (pages 18-19), the Examiner relied upon the Andrews reference to teach an instruction means receiving an instruction from a user regarding the second energy subtraction processing prior to outputting the instructions for the second energy subtraction processing (page 19 of the Office Action citing col. 2, lines 43-61; col. 3, lines 23-33 and col. 5, lines 13-48) and relied upon the Shimura and Sones references to teach the other details of the image signal processing apparatus (see rejection of claims 5, 6, 7 and 25; pages 6-10, 19 and 20). The Andrews reference clearly teaches an instruction means

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receiving instructions from a user regarding the energy subtraction procedures to be performed before the processing is performed. The Examiner believes the combination of the teachings of Shimura and Andrews (as applied to claim 24) and Shimura, Sones and Andrews (as applied to claim 26), teach all the limitations of claims 24 and 26 as presently recited, and that such a combination of the teachings as presented in the Previous Final Office Action would have been obvious to one of ordinary skill in the art at the time the invention was made.

Applicant does not traverse the Examiner's assertion of Official Notice regarding signal transfer cables and filing devices, therefore the common knowledge or well-known in the art statement is taken to be admitted prior art.

Claim Objections

Claims 2, 3 and 14 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 13, from which claims 2, 3, and 14 depend, recites, "wherein an image position correcting means outputs the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing to a storage means, and wherein the pair of the corrected original image signals are transferred from the storage means to a common energy subtraction processing means." The limitations recited in claims 2, 3 and 14 fail to further limit the storage and transfer of the corrected original images, the second energy subtraction processing or the common energy subtraction processing means already described in claim 13.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 2-4, 6, 9/6 and 11-20 are rejected under 35 U.S.C. 102(b) as being anticipated by USPN 5,301,107 to Shimura.

Regarding claim 13, Shimura discloses a radiation image signal processing method (col. 1, lines 7-12), comprising the steps of:

- i) performing image position correcting processing for correcting a low energy image signal and/or a high energy image signal such that a position of an image, which is represented by the low energy image signal, and a position of an image, which is represented by the high energy image signal, coincide with each other, a pair of corrected original image signals being thereby obtained (col. 14, lines 52-65; col. 15, lines 1-14, Shimura teaches position adjustment processing is carried out on the image signals SO1 (low energy image) and SO2 (high energy image) such that the positions of the images coincide with each other.),
- ii) performing first energy subtraction processing on the pair of the corrected original image signals (col. 15, lines 15-40; Fig. 6, col. 19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing energy subtraction to produce the bone image signal S1.), and

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iii) performing second energy subtraction processing with respect to the low energy image signal and the high energy image signal (col. 15, lines 41-54; Fig. 6, col. 19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing energy subtraction to produce the soft tissue image signal S2.),

wherein the second energy subtraction processing is performed by the utilization of the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing (col. 15, lines 1-54; Fig. 6, col. 19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing position adjustment processing and then performing the first and second energy subtraction processing. It is clear the first and second energy subtraction processing are performed using the same pair of position adjusted image signals.).

wherein an image position correcting means outputs the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing to a storage means (col. 15, lines 1-14; col. 18, line 60 – col. 19, line 9).

Shimura further discloses a common energy subtraction processing means (Fig. 11, col. 14, line 28 – col. 15, line 50, The same image processing and display apparatus performs both the first and second energy subtraction processing. Also see arguments presented above.).

Shimura does not explicitly recite the pair of the corrected original image signals are transferred from the storage means to a common energy subtraction processing means when an instruction means outputs an instruction to a control means which controls the common energy subtraction processing means such that the common energy subtraction processing means performs the second energy subtraction processing by the utilization of the pair of the corrected original image signals. However, Shimura teaches the image processing is performed on an

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apparatus including a CPU, floppy disk drive, CRT display and internal memory (Fig. 11; col. 14, lines 28-37), which clearly describe a conventional computer. Shimura clearly teaches the signals are stored in the internal memory (col. 18, line 60 – col. 19, line 9). Transferring data between the internal memory and the CPU for processing is inherent to the functionality of a conventional computer, thus transferring the pair of the corrected original image signals from the internal memory to the processor for energy subtraction processing is inherent to the system taught by Shimura. Also, instructions such as software programs are inherent to the functionality of conventional computers and thus an instruction means outputting instructions to a control means for performing the energy subtraction processing is inherent to the apparatus taught by Shimura.).

Regarding claim 2, Shimura discloses the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing, are stored (col. 18, line 60.– col. 19, line 9, Shimura teaches the image signals are stored in the internal memory. Also, please see discussion above in the response section.), and

the second energy subtraction processing is performed by the utilization of the pair of the corrected original image signals, which have thus been stored (col. 18, line 60 – col. 19, line 9, Shimura teaches both the first and second energy subtraction processing are performed on the image signals stored in the internal memory.).

Regarding claim 3, Although Shimura does not explicitly recite the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction

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processing, are transferred to a certain destination, and the second energy subtraction processing is performed at the transfer destination by the utilization of the pair of the corrected original image signals, which have thus been transferred. Shimura teaches the image processing is performed on an apparatus including a CPU, floppy disk drive, CRT display and internal memory (Fig. 11; col. 14, lines 28-37), which clearly describe a conventional computer. Shimura clearly teaches the signals are stored in the internal memory (col. 18, line 60 – col. 19, line 9). Transferring data between the internal memory and the CPU for processing is inherent to the functionality of a conventional computer, thus transferring the corrected image signals from the internal memory to a transfer destination (CPU) for energy subtraction processing is inherent to the system and method taught by Shimura.

Regarding claim 14, Shimura further discloses the transfer destination is the common energy subtraction processing means (Fig. 11, col. 14, line 28 – col. 15, line 50, The same image processing and display apparatus performs both the first and second energy subtraction processing. Also see arguments presented above for claims 13 and 3 and in Response to Arguments.).

Regarding claim 4, Shimura discloses the image position correcting processing is performed on only the high energy image signal (col. 15, lines 1-14, The reference in essence allows either one to be corrected with respect to the other signal, thus meeting the limitation.).

Regarding claim 11, Shimura further discloses the image position correcting processing is performed by an image position correcting means which receives the low energy image signal and the high energy image signal from a buffer memory which temporarily stores the low energy image signal and the high energy image signal (col. 14, lines 17 – col. 15, line 14, Shimura teaches the first and second image signals are stored in the internal memory and then position adjustment processing is carried out.).

Regarding claim 12, Shimura further discloses the buffer memory receives the low energy image signal and the high energy image signal from a radiation image recording and readout apparatus (Fig. 11, col. 13, line 33 – col. 14, line 51, Shimura teaches the first and second X-ray images have been stored on stimuable phosphor sheets which are exposed to a laser beam and emit light. The emitted light is converted to electric signals that are sampled and amplified to form the first and second image signals.).

Regarding claim 6, Shimura discloses a radiation image signal processing apparatus (Fig. 11) wherein:

- i) image position correcting processing is performed for correcting a low energy image signal and/or a high energy image signal such that a position of an image, which is represented by the low energy image signal, and a position of an image, which is represented by the high energy image signal, coincide with each other, a pair of corrected original image signals being thereby obtained (col. 14, lines 52-65; col. 15, lines 1-14, Shimura teaches position

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adjustment processing is carried out on the image signals SO1 (low energy image) and SO2 (high energy image) such that the positions of the images coincide with each other.),

ii) first energy subtraction processing is performed on the pair of the corrected original image signals (col. 15, lines 15-40; Fig. 6, col. 19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing energy subtraction to produce the bone image signal S1.), and

iii) second energy subtraction processing is performed with respect to the low energy image signal and the high energy image signal (col. 15, lines 41-54; Fig. 6, col. 19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing energy subtraction to produce the soft tissue image signal S2.),

the second energy subtraction processing being performed by the utilization of the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing (col. 15, lines 1-54; Fig. 6, col. 19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing position adjustment processing and then performing the first and second energy subtraction processing. It is clear the first and second energy subtraction processing are performed using the same pair of position adjusted image signals.), said apparatus comprising:

a) common energy subtraction processing means for performing the first energy subtraction processing and the second energy subtraction processing (Fig. 11, col. 14, line 17- col. 15, line 50, Shimura discloses an image processing and display apparatus (computer) for performing first and second energy subtraction processing.),

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b) storage means for storing the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing (col. 14, lines 17-37, col. 18, line 60 – col. 19, line 9, Shimura teaches the apparatus contains internal memory.),

c) instruction means for outputting an instruction for performing the second energy subtraction processing (Although not explicitly reciting an instruction means, the processing and display apparatus taught by Shimura is clearly a conventional computer (Fig. 11; col. 14, lines 17-37). Instructions such as software programs are inherent to the functionality of conventional computers and thus an instruction means for performing the energy subtraction processing is inherent to the apparatus taught by Shimura.), and

d) control means for controlling the common energy subtraction processing means in accordance with the instruction, which has been outputted from the instruction means, such that the common energy subtraction processing means performs the second energy subtraction processing by the utilization of the pair of the corrected original image signals, which have been stored in the storage means (col. 14, lines 17-37, Shimura teaches the image processing and display apparatus includes a CPU.).

Regarding claim 9/6, Shimura further discloses the image position correcting processing is performed on only the high energy image signal (col. 15, lines 1-14, The reference in essence allows either one to be corrected with respect to the other signal, thus meeting the limitation.).

Regarding claim 15, Shimura further discloses the image position correcting processing is performed by an image position correcting means which receives the low energy image signal

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and the high energy image signal from a buffer memory which temporarily stores the low energy image signal and the high energy image signal (col. 14, lines 17 – col. 15, line 14, Shimura teaches the first and second image signals are stored in the internal memory and then position adjustment processing is carried out.).

Regarding claim 16, Shimura further discloses the buffer memory receives the low energy image signal and the high energy image signal from a radiation image recording and read-out apparatus (Fig. 11, col. 13, line 33 – col. 14, line 51, Shimura teaches the first and second X-ray images have been stored on stimuable phosphor sheets which are exposed to a laser beam and emit light. The emitted light is converted to electric signals that are sampled and amplified to form the first and second image signals.).

Regarding claim 17, Shimura further discloses an image position correcting means output the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing to a storage means (col. 15, lines 1-14; col. 18, line 60 – col. 19, line 9).

Shimura does not explicitly recite the pair of the corrected original image signals are transferred from the storage means to the common energy subtraction processing means when an instruction means outputs an instruction to a control means which controls the common energy subtraction processing means such that the common energy subtraction processing means performs the second energy subtraction processing by the utilization of the pair of the corrected original image signals. However, Shimura teaches the image processing is performed on an

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apparatus including a CPU, floppy disk drive, CRT display and internal memory (Fig. 11; col. 14, lines 28-37), which clearly describe a conventional computer. Shimura clearly teaches the signals are stored in the internal memory (col. 18, line 60 – col. 19, line 9). Transferring data between the internal memory and the CPU for processing is inherent to the functionality of a conventional computer, thus transferring the pair of the corrected original image signals from the internal memory to the processor for energy subtraction processing is inherent to the system taught by Shimura. Also, instructions such as software programs are inherent to the functionality of conventional computers and thus an instruction means outputting instructions to a control means for performing the energy subtraction processing is inherent to the apparatus taught by Shimura.).

Regarding claim 18, Shimura further discloses an image position correcting means outputs the pair of the corrected original image signals, which have been stored in the storage means to the common energy subtraction processing means for performing the second energy subtraction processing (Fig. 11; col. 14, line 28 – col. 15, line 50; col. 18, line 60 – col. 19, line 9, Shimura teaches position adjustment of the image signals and the same image processing and display apparatus performs both the first and second energy subtraction processing using the image signals stored in the internal memory.).

Regarding claim 19, Shimura further discloses an image position correcting means outputs the pair of the corrected original image signals to the common energy subtraction processing means for performing the first energy subtraction processing (Fig. 11; col. 14, line 28

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– col. 15, line 50, Shimura teaches position adjustment of the image signals and the same image processing and display apparatus performs both the first and second energy subtraction processing using the image signals.).

Regarding claim 20, wherein a buffer memory receives the low energy image signal and the high energy image signal from a radiation image recording and read-out apparatus (Fig. 11, col. 13, line 33 – col. 14, line 51, Shimura teaches the first and second X-ray images have been stored on stimuable phosphor sheets which are exposed to a laser beam and emit light. The emitted light is converted to electric signals that are sampled and amplified to form the first and second image signals.), and

wherein the buffer memory outputs the low energy image signal and the high energy image signal to an image position correcting means which performs the image position correcting processing (col. 14, line 66 – col. 15, line 14, Shimura teaches the image signals are read from the internal memory and position adjustment processing is carried out.).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimura in view of USPN 4,449,195 to Andrews et al. (Andrews).

Regarding claim 24, Shimura teaches the image processing and displaying apparatus is provided with a keyboard from which instructions are entered, but is silent with regard to the instruction means receives an instruction from the user regarding the second energy subtraction processing prior to outputting the instruction for the second energy subtraction processing. Andrews teaches if a user desires to perform ad particular fluorographic procedure her or she is simply obliged to have the identification for the procedure fed by way of the CRT terminal keyboard the host CPU. The CPU then assembles the instructions for the procedure (col. 2, lines 43-61). Andrews further discloses the procedures that can be performed include obtaining high and low images (col. 3, lines 23-33) subtracting to obtain bone and soft tissue images (col. 5, lines 13-48). The user input is performed before the image processing begins and can therefore be considered as prior to the outputting of the instructions for the second energy subtraction processing. The teachings of Shimura and Andrews are combinable because they are both concerned with image processing of medical images including energy subtraction to obtain bone and soft tissue images. It would have been obvious to one of ordinary skill in the art at the time the invention was made for the apparatus taught by Shimura to receive an instruction from a user regarding the second energy subtraction prior to outputting the instruction for the second energy subtraction processing at taught by Andrews in order to provide the user with control over the procedure to be performed by the system and control over the conditions and timing of the procedure.

Claim 27 rejected under 35 U.S.C. 102(b) as anticipated by Shimura or, in the alternative, under 35 U.S.C. 103(a) as obvious over the combination of Shimura and Sones.

Claim 27 recites, “the first energy subtraction processing provides an observation image, and wherein the second energy subtraction processing provides a second observation image.” Provided the broadest reasonable interpretation of “an observation image,” the image could be construed as an image representing (or consisting of) features of interest in the examination. In this case, the soft tissue image (Fig. 9, “47”) and the bone image (Fig. 9, “43”) clearly identify bone features and soft tissue features. Claim language does not necessitate the observation image be a visibly displayed image.

If, on the other hand, an observation image is construed as a visible image displayed for observation by user, Shimura is silent with regard to displaying soft tissue image “47” and bone image “43” (although Shimura’s differentiation between an “image signal” and an “image” may indicate the contrary, see col. 14, lines 28-32). Shimura does teach displaying further processed bone and soft tissue images (col. 22, lines 21-26, 50-54). Sones teaches a display for displaying both the soft tissue image and the bone tissue image (Fig. 1; col. 7, lines 43-45). The teaching of Sones clearly identifies it is well known in the art to display both the bone and soft tissue images on a display for observation by user. It would have been obvious to one of ordinary skill in the art at the time the invention was made for the first and second subtraction processing taught by Shimura to provide observation images (to visibly display the soft tissue and bone images for

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observation) as taught by Sones in order for the user to evaluate the image subtractions and processing results and to observe both the bone tissue and soft tissue simultaneously.

Claims 8, 9/8/26, 9/26, 21, 22, 23 and 26 are rejected under 35 U.S.C. 103(a) as obvious over the combination of Shimura, Sones and Andrews.

Regarding claim 26, Shimura discloses a radiation image signal processing apparatus (Fig. 11) wherein:

- i) image position correcting processing is performed for correcting a low energy image signal and/or a high energy image signal such that a position of an image, which is represented by the low energy image signal, and a position of an image, which is represented by the high energy image signal, coincide with each other, a pair of corrected original image signals being thereby obtained (col. 14, lines 52-65; col. 15, lines 1-14, Shimura teaches position adjustment processing is carried out on the image signals SO1 (low energy image) and SO2 (high energy image) such that the positions of the images coincide with each other.),
- ii) first energy subtraction processing is performed on the pair of the corrected original image signals (col. 15, lines 15-40; Fig. 6, col. 19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing energy subtraction to produce the bone image signal S1.), and
- iii) second energy subtraction processing is performed with respect to the low energy image signal and the high energy image signal (col. 15, lines 41-54; Fig. 6, col. 19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing energy subtraction to produce the soft tissue image signal S2.),

the second energy subtraction processing being performed by the utilization of the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing (col. 15, lines 1-54; Fig. 6, col. 19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing position adjustment processing and then performing the first and second energy subtraction processing. It is clear the first and second energy subtraction processing are performed using the same pair of position adjusted image signals.), said apparatus comprising:

a) first energy subtraction processing means for performing the first energy subtraction processing (Fig. 11, col. 14, lines 17- col. 15, line 35), Shimura discloses an image processing and display apparatus (computer) for performing the first energy subtraction processing.),

b) second energy subtraction processing means for performing the second energy subtraction processing (Fig. 11, col. 14, lines 17- col. 15, line 50, Shimura teaches an image processing and display apparatus for performing the second energy subtraction processing. Current claim language does not exclude the first and second energy subtraction processing means from being the same.),

c) storage means for storing the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing (col. 14, lines 17-37, col. 18, line 60 – col. 19, line 9, Shimura teaches the image processing and display apparatus contains internal memory.),

d) instruction means for outputting an instruction for performing the second energy subtraction processing (Although not explicitly reciting an instruction means, the processing and

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display apparatus taught by Shimura is clearly a conventional computer (Fig. 11; col. 14, lines 17-37). Instructions such as software programs are inherent to the functionality of conventional computers and thus an instruction means for performing the energy subtraction processing is inherent to the apparatus taught by Shimura.), and

e) control means for controlling the second energy subtraction processing means in accordance with the instruction, which has been outputted from the instruction means, such that the second energy subtraction processing means performs the second energy subtraction processing by the utilization of the pair of the corrected original image signals, which have been stored in the storage means (col. 14, lines 17-37, Shimura teaches the image processing and display apparatus includes a CPU.).

Shimura is silent with regard to the first energy subtraction processing means and the second energy subtraction processing means being physically separated. However, Sones teaches a first material specific image filter and transform means to obtain a soft tissue specific image and a second material specific image filter and transform means to obtain a bone selective image which are physically separated (Fig. 1; col. 6, line 25 – col. 7, line 61). The teachings of Shimura and Sones are combinable because they are both concerned with image processing or medical images, specifically, obtaining bone and soft tissue images. It would have been obvious to one of ordinary skill in the art at the time the invention was made for the system taught by Shimura to implement the first and second energy subtraction processing means physically separated as taught by Sones in order have the filter functions uniquely adapted to selected material for the material specific image to be generated resulting in enhanced electronic images and reduced noise degradation (col. 4, lines 23-32; col. 7, lines 36-39).

Shimura teaches the image processing and displaying apparatus is provided with a keyboard from which instructions are entered, but is silent with regard to the instruction means receives an instruction from the user regarding the second energy subtraction processing prior to outputting the instruction for the second energy subtraction processing. Andrews teaches if a user desires to perform ad particular fluorographic procedure her or she is simply obliged to have the identification for the procedure fed by way of the CRT terminal keyboard the host CPU. The CPU then assembles the instructions for the procedure (col. 2, lines 43-61). Andrews further discloses the procedures that can be performed include obtaining high and low images (col. 3, lines 23-33) subtracting to obtain bone and soft tissue images (col. 5, lines 13-48). The user input is performed before the image processing begins and can therefore be considered as prior to the outputting of the instructions for the second energy subtraction processing. The teachings of Shimura and Andrews are combinable because they are both concerned with image processing of medical images including energy subtraction to obtain bone and soft tissue images. It would have been obvious to one of ordinary skill in the art at the time the invention was made for the apparatus taught by Shimura to receive an instruction from a user regarding the second energy subtraction prior to outputting the instruction for the second energy subtraction processing at taught by Andrews in order to provide the user with control over the procedure to be performed by the system and control over the conditions and timing of the procedure.

Regarding claim 8, Shimura further discloses the apparatus comprises:

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first energy subtraction processing means for performing the first energy subtraction processing (Fig. 11, col. 14, lines 17- col. 15, line 35), Shimura discloses an image processing and display apparatus (computer) for performing the first energy subtraction processing.),

second energy subtraction processing means for performing the second energy subtraction processing (Fig. 11, col. 14, lines 17- col. 15, line 50, Shimura teaches an image processing and display apparatus for performing the second energy subtraction processing. Current claim language does not exclude the first and second energy subtraction processing means from being the same.),

instruction means for outputting an instruction for performing the second energy subtraction processing (Although not explicitly reciting an instruction means, the processing and display apparatus taught by Shimura is clearly a conventional computer (Fig. 11; col. 14, lines 17-37). Instructions such as software programs are inherent to the functionality of conventional computers and thus an instruction means for performing the energy subtraction processing is inherent to the apparatus taught by Shimura.), and

control means for transferring the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing, to the second energy subtraction processing means, and controlling the second energy subtraction processing means in accordance with the instruction, which has been outputted from the instruction means, such that the second energy subtraction processing means performs the second energy subtraction processing by the utilization of the pair of the corrected original image signals, which have thus been transferred (col. 14, lines 17-37, Shimura teaches the image processing and display apparatus includes a CPU.). Shimura teaches the image processing is performed on an apparatus

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including a CPU, floppy disk drive, CRT display and internal memory (Fig. 11; col. 14, lines 28-37), which clearly describe a conventional computer. Shimura clearly teaches the signals are stored in the internal memory (col. 18, line 60 – col. 19, line 9). Transferring data between the internal memory and the CPU for processing is inherent to the functionality of a conventional computer, thus the control means for transferring the pair of the corrected original image signals from the internal memory to the processor for energy subtraction processing is inherent to the system taught by Shimura.

Regarding claims 9/26 and 9/8/26, Shimura further discloses the image position correcting processing is performed on only the high energy image signal (col. 15, lines 1-14, The reference in essence allows either one to be corrected with respect to the other signal, thus meeting the limitation.).

Regarding claim 21, Shimura further discloses an image position correcting means outputs the pair of the corrected original image signals to a storage means, and to the first energy subtraction processing means generates an energy subtraction image signal by utilizing the pair of the corrected original image signals received from the image position correcting means (col. 15, lines 1-35; col. 18, line 60 – col. 19, line 9, Shimura discloses image position adjustment processing and performing energy subtraction using the first and second image signals stored in the internal memory.).

Regarding claim 22, Shimura does not disclose an image position correcting means outputs the pair of the corrected original image signals to a signal transfer cable, the signal transfer cable transfers the pair of the corrected original image signals to a filing device which stores the pair of the corrected original image signals. The Examiner takes Official Notice that signal transfer cables and filing devices (an example being a hard disk drive), are well known in the art of image processing utilizing computers such as the apparatus taught by Shimura. Signal transfer cables such as those connecting a hard disk drive to the other components of the computer are well known and would have been obvious to one of ordinary skill in the art in order to store the images on a hard disk drive providing safe and stable storage as well providing as a large storage capacity which may be needed for large images of X-ray images such as those produced by the invention of Shimura.

Regarding claim 23, Shimura teaches the buffer memory outputs the pair of the corrected original image signals to the second energy subtraction processing means which generates an energy subtraction image signal by utilizing the pair of the corrected original image signals (col. 18, line 60 – col. 19, line 9).

Shimura does not disclose a filing device output the pair of the corrected original image signals to a signal transfer cable which transfers the pair of the corrected original image signals to a buffer memory. The Examiner takes Official Notice that signal transfer cables and filing devices (an example being a hard disk drive), are well known in the art of image processing utilizing computers such as the apparatus taught by Shimura. Signal transfer cables such as those connecting a hard disk drive to the memory of a computer are well known and would have been

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obvious to one of ordinary skill in the art in as storage on the hard disk drive provides safe and stable storage as well providing as a large storage capacity thus reducing the amount of buffer memory required as it only needs to store images currently to be processed.

Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Shimura and Sones.

Regarding claim 28, Shimura discloses a radiation image signal processing apparatus (Fig. 11) wherein:

i) image position correcting processing is performed for correcting a low energy image signal and/or a high energy image signal, such that a position of an image, which is represented by the low energy image signal, and a position of an image, which is represented by the high energy image signal, coincide with each other, a pair of corrected original image signals being thereby obtained (col. 14, lines 52-65; col. 15, lines 1-14, Shimura teaches position adjustment processing is carried out on the image signals SO1 (low energy image) and SO2 (high energy image) such that the positions of the images coincide with each other.),

ii) first energy subtraction processing is performed on the pair of the corrected original image signals (col. 15, lines 15-40; Fig. 6, col. 19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing energy subtraction to produce the bone image signal S1.), and

iii) second energy subtraction processing is performed with respect to the low energy image signal and the high energy image signal (col. 15, lines 41-54; Fig. 6, col. 19, lines 3-9;

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Fig. 9, col. 23, lines 17-39, Shimura teaches performing energy subtraction to produce the soft tissue image signal S2.), and

the second energy subtraction processing being performed by the utilization of the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing (col. 15, lines 1-54; Fig. 6, col. 19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing position adjustment processing and then performing the first and second energy subtraction processing. It is clear the first and second energy subtraction processing are performed using the same pair of position adjusted image signals.).

Shimura does not disclose the corrected image signals are sent to a first site during first energy subtraction processing and the corrected image signals are sent to a second site during the second energy subtraction processing. However, Sones teaches high and low energy images are sent from memory to a first material specific image filter and transform means (first site) to obtain a soft tissue specific image and to a physically separate second material specific image filter and transform means (second site) to obtain a bone selective image (Fig. 1; col. 6, line 25 – col. 7, line 61). The teachings of Shimura and Sones are combinable because they are both concerned with image processing or medical images, specifically, obtaining bone and soft tissue images. It would have been obvious to one of ordinary skill in the art at the time the invention was made for the system taught by Shimura to implement the first and second energy subtraction processing as first and second sites as taught by Sones in order have the filter functions uniquely adapted to selected material for the material specific image to be generated resulting in enhanced electronic images and reduced noise degradation (col. 4, lines 23-32; col. 7, lines 36-39).

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Regarding claim 29, Sones further discloses the first site corresponds to a physically separate location from said second site (Fig. 1; col. 6, line 25 – col. 7, line 61). The first and second image filter and transform means are clearly shown as physically separated (“40” and “50” as shown in Fig. 1) and therefore do not occupy the same exact space and thus are construed as physically separate locations.

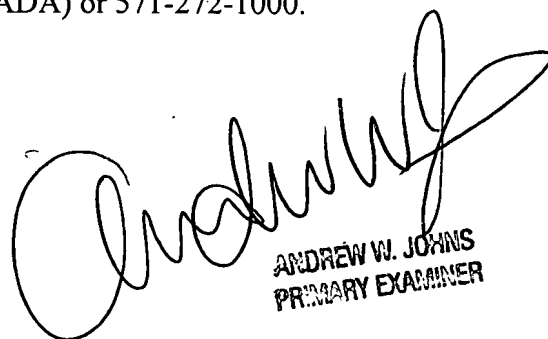
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony Mackowey whose telephone number is (571) 272-7425. The examiner can normally be reached on M-F 9:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bella Matthew can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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5/29/07



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